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DOOR CLOSER
[Türschliesser]

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The invention relates to a door closer according to the preambles of Claims 1 and 2, in which, first, a lifting cam disc is provided, which is connected with a non-positive and positive fit to a driven shaft projecting from a housing filled with a damping medium, wherein the lifting cam disc contacts a contact pressure roll on each side viewed in the axial direction on the door closer and, on the other hand, is in active connection with a damping piston, wherein the piston and the housing are made from an oil-resistant plastic and, on the other hand, a door closer with a plastic piston having internal teeth, which is driven by means of a pinion arranged with a non-positive or positive fit on a driven shaft, wherein the driven shaft projects, at least on one side, from a housing surrounding the piston and a closing spring.

A class-forming door closer of Claim 1 has become known from the Swiss Patentschrift 281 690. The door closer described there can be used for DIN left-hung and DIN right-hung doors, wherein an existing driven shaft is equipped with a symmetric cam disc that contacts the piston and, thus, the closing spring. Both the housing and also the piston are manufactured from an oil-resistant plastic.

DE G 94 13 039 U1 shows a class-forming door closer according to the preamble of Claim 2, where a door closer is described, which reproduces internal teeth in a piston. Here, the teeth and the piston are constructed as separate components, wherein advantageously the teeth are manufactured from material different than plastic, from which, namely, the piston is made. Likewise, at least parts of the pinion engaged with the teeth are made partially from metal and plastic.

From DE 40 02 889 A1, a door closer is taken, whose housing is constructed as a hollow chamber /2* profile. This hollow chamber profile is one piece and is made from an extruded profile, whose material is made from an aluminum alloy or plastic. A damping piston, which is assembled from a solid body and

* [Numbers in right margin indicate pagination of the original text.]

an elastic body made from rubber or plastic connected to the solid body is described in DE-AS 10 39 886.

A piston, which shows external teeth in the form of an engaged toothed rod, which is made from metal or plastic, is to be taken from US 4,019,222.

The task of the invention consists in producing a lightweight, economical door closer, in which typical cutting processing can be eliminated.

The task of the invention is achieved with the characteristics of Claims 1 and 2.

Therefore, for reducing costs, it is proposed according to the invention, in addition to the known parts made from plastic, to manufacture all of the processing-intensive parts from plastic. These are, in particular, the damping piston, the spring piston, and the housing, which interact with the lifting cam disc. In addition, it is proposed to also produce the parts outside of the door closer, such as the scissors-type linkage or activation arm in a sliding-rail door closer in connection with the sliding rail, all from plastic. Here it is irrelevant whether it involves a floor door closer, frame door closer, or inside door closer.

Typically, the cylindrical walls surrounding the piston are round. This is because the round shape is the simplest to realize in the subsequent processing that already takes place. However, if an economical, small door closer is desired, that is, a door closer that does not have a strong construction, the cross section of the piston, that is, the damping piston and the spring piston or else also the plastic piston with /3 teeth can assume a different cross section than a round cross section, namely an oval, rectangular, square, or quadrangular cross section. All of the shapes are easy to manufacture in plastic in terms of production, because the housings or pistons are produced in the so-called injection-molding method. These methods currently have enormous dimensional tolerance and thus dimensional accuracy due to the available plastics.

Thus, it is possible to manufacture door closers, for example, according to DE 36 45 314 C2 and DE 36 45 315 C2, in plastic without extra costs, in which the teeth of the piston have different sizes and different modules. Also, the counter teeth of the driven shaft engaging with these teeth can also be made from plastic without a problem.

Due to the geometric cross sections, such a housing does not absolutely have to be produced from a part in an injection-molding method. This is also possible from several segments or partial segments. These segments or partial segments are assembled or set against each other by means of molded gauge pins or projections and thus matching recesses in the counter part and can be permanently connected to each other with a non-positive or positive fit through corresponding methods, such as adhesion, ultrasonic fusing, laser fusing, or the like. Through this method, the dimensional stability of the individual segments is maintained. Simultaneously, in the construction in the individual segments for the housing, it is also possible to form or produce channels, boreholes, pockets, valve seats, or also valves themselves directly during the production process without subsequent processing. In this way, the assembly expense and thus the production cost factor is reduced.

Typically, for door closers the ends are closed by so-called caps or closures. According to the completed segment in the object according to the invention, these do not absolutely have to be present, because a pre-assembly of individual parts is definitely conceivable through the joining of the individual segments that are closed on one side. On segments, on which closure is possible only at a later time, separate closures are then attached. These closures can also be connected with a non-positive or positive /4 fit to the segments or to the housing through adhesion, ultrasonic fusing, or the like. Here, in addition to stump constructions, closures also provided with grooves, undercuts, or bayonet closures are also to be used, because the assembly times for joining can be reduced in this way.

The attachment devices can also be formed simultaneously without cutting for an injection-molding construction in plastic in the form of corresponding boreholes, in order to assemble the door closers in the completed state at its original position. The invention will be described in more detail below with reference to different embodiments shown schematically.

Figure 1, an axial section through a side view of an upper door closer with a lifting cam disc,

Figure 2, an axial section through a top view of an upper door closer according to Figure 1,

Figure 3, a section through an upper door closer in the front view with inner teeth,

Figure 4, section through a top view of an upper door closer according to Figure 3,

Figure 5, section through a housing of a door closer, which is made from individual segments,

Figure 6, side view of two housing halves made from two housing segments with a quadratic cross section of the piston space.

In addition to the following description of figures of various embodiments according to an upper door closer, the concept according to the invention is also to be applied to ground door closers, frame door closers, and inside door closers. For the upper door closers, frame door closers, and inside door closers, /5 both a linkage in the form of a scissors-type linkage or an activation arm connected to a sliding rail can be used. These parts, sliding rail, activation arm, and scissors-type linkage are also produced from a plastic having the corresponding strength.

The door closer reproduced in Figures 1 and 2 has a lifting cam disc 1, which is penetrated by a driven axle 3. The drive axle 3 is supported in the upper region by a driven axle bearing 17 and in the lower region by a driven axle bearing 16 within a housing 2. The support here consists of a sintered material or a needle bearing or ball bearing. The driven axle bearings 16 and 17 can also be produced from plastic, in addition to the housing 2. The curved tracks of the lifting cam disc 1 come in contact on one side with a contact pressure roller 7, which is supported by means of an axle 14 within a damping

piston 14. On the other side, the lifting curve disc 1 is in contact with a contact pressure roller 8, which is supported by means of an axle 15 within a spring piston 6. A closing spring 13 comes in contact, on one end, against the other end of the spring piston 6 and, on the other end, against a spring counter plate 31. The lateral ends of the housing 2 are closed by closures 18 and 19, which are connected with a non-positive and/or positive fit to the housing 2 either through adhesion, ultrasonic fusing, laser fusing, or the like. Because corresponding channels 20 in connection with valves 29 are necessary for the control function of a door closer, these are formed without cutting simultaneously in the housing 2 in the production process. Both within the damping piston 4 and also in the spring piston 6, non-return valves 5 are formed simultaneously also during the production process of this piston. However, it is also possible to produce these non-return valves 5 separately, wherein, in such a case, they are only made from plastic.

To mount such a housing 2 on a door or above the door, an attachment device 28 is formed without cutting simultaneously in or on the housing 2 during the production process.

It is understood through the method of plastic processing without subsequent work that other shapes /6 are also possible, in addition to the continuous cylinder borehole for the damping piston 4, the spring piston 6, and the closing spring 13, which have a round construction in the state of the art. These are, in particular, an oval shape, which would mean, at the same time, that the closer would be significantly narrower in its dimensions, or rectangular or quadratic shape.

In Figure 2, in which a one-piece housing is shown, it becomes clear that no problems with respect to heat expansion can occur due to the use of the same materials both for the damping piston 4 and also the spring piston 6 and the lifting cam disc 1 with the driven axle 3 due to heating, for example, due to solar irradiation for such a door closer, because the material that is used for all of the components has the same coefficient of expansion. This is not given in the state of the art, because for the use, for example,

of steel or lightweight metal in connection with plastic, these have very different coefficients of expansion, which would definitely lead to leakage or failure of such a door.

In another embodiment of Figures 3 and 4, a toothed rod door closer with a piston 10, which is made from plastic and which has inner teeth 11, is shown. A pinion 12 is in active connection with the teeth 11, wherein the pinion 12 is formed with a non-positive or positive fit on the driven axle 3. In addition to the housing 9, in this embodiment the piston 10 with its teeth 11 and the driven axle 3 with its pinion 12 are also produced from plastic. Thus, the door closer has the same properties of Figures 1 and 2, that is, in this door closer, heating due to the same coefficients of expansion would not produce failure with respect to the function. The ends of the housing 9 are also closed by closures 18 and 19, which are also connected with a non-positive or positive fit to the housing 9 by adhesion, ultrasonic fusing, laser fusing, or the like.

For the construction of a ground door closer completely in plastic, naturally also the cement case /7
belonging to the ground door closer is also produced from plastic.

The embodiment shown in Figure 5 shows a housing of a door closer, which is assembled from different segments 21 and 22. Here, it is possible to construct different segments individually with respect to production, for example, the segment 22, which is shown as a segment that is open on one side with molded attachments 28. At the connecting positions, the segments 21 and 22 have gauge pins 26 and recesses 27, which engage each other when joined together and produce a non-positive or positive fit and also a dimensionally stable shape in a subsequent method for connecting the segments 21 and 22. The piston space 30, which is located within the segments 21 and 22, is closed on the open side of the segment 21 by a closure 19. In the segment 21, a borehole 23 is formed simultaneously without cutting for the driven axle bearing 16 and 17 shown in Figure 1.

In addition to the division of segments 21 and 22, it is also possible to divide the segments in a different form, as Figure 6 shows. Here, segments 24 and 25 are shown, which are connected to each other in the longitudinal direction of the door closer by means of gauge pins 26 and recesses 27. Simultaneously, in this embodiment of Figure 6, the piston space 30 is shown as a quadratic piston space.

In the embodiments named above, which do not claim completeness, it is assumed that they involve door closers of any type that are assembled without later processing of the individual parts and segments. Here, such an assembly can also be performed in an automatic method. The parts produced from plastic, advantageously in an injection-related method, are connected to each other with a non-positive or positive fit without later additional processing through adhesion, ultrasonic fusing, laser fusing, or the like. As the plastic, a carbon fiber-reinforced or glass fiber-reinforced plastic can be used. /8

Reference symbols /9

1 Lifting cam disc

2 Housing

3 Driven axle

4 Damping piston

5 Non-return valve

6 Spring piston

7 Contact pressure roller

8 Contact pressure roller

9 Housing

10 Piston

11	Teeth
12	Pinion
13	Closing spring
14	Axle
15	Axle
16	Driven axle bearing
17	Driven axle bearing
18	Closure
19	Closure
20	Channel
21	Segment
22	Segment
23	Borehole for driven axle
24	Segment
25	Segment
26	Gauge pin
27	Recess
28	Attachment device
29	Valve
30	Piston space
31	Spring counter plate

Claims /10

1. Door closer, which has a lifting cam disc that is connected with a non-positive or positive fit to a driven shaft projecting from a housing filled with a damping medium, wherein the lifting cam disc contacts a contact pressure roller on each side viewed in the axial direction toward the door closer and is actively connected, on one side, to a spring piston charged with a closing spring and, on the other side, with a damping piston, wherein the piston and the housing are made from an oil-resistant plastic, characterized in that, in addition to the damping piston (4), the spring piston (6), and the housing (2), the lifting cam disc (1), the driven axle (3), and/or the contact pressure rollers (7, 8) are also made from plastic.

2. Door closer with a plastic piston, which has internal teeth and which is driven by means of a pinion arranged on a driven shaft with a non-positive or positive fit, wherein the driven shaft projects at least on one side from a housing surrounding the piston and the closing spring, characterized in that the housing (9) is made from plastic.

3. Door closer according to Claims 1 and 2, characterized in that the door closer is a ground door closer or a door closer with a scissors-type linkage or activation arm in connection with a sliding rail or a frame door closer or an inside door closer, wherein the scissors-type linkage, the activation arm, and the sliding rail are also made completely or partially from plastic.

4. Door closer according to Claims 1 and 2, characterized in that the damping piston (4), the spring piston (6), and the plastic piston (10) have an oval cross section.

5. Door closer according to Claims 1 and 2, characterized in that the damping piston (4), the spring piston (6), and the plastic piston (10) has a rectangular or quadratic cross section. /11

6. Door closer according to Claim 2, characterized in that the inner teeth has teeth of different size with a different module, wherein the counter teeth of a pinion (12) of the driven shaft have a complementary profile.

7. Door closer according to Claims 1 and 2, characterized in that the housing (2) and (9) is made from segments (21, 22, 24, 25) or sub-segments, which are connected to each other.

8. Door closer according to Claim 7, characterized in that the segments (21, 22, 24, 25) can be assembled or set on each other by means of molded gauge pins (26) or projections and thus matching recesses (27).

9. Door closer according to Claim 7, characterized in that channels (20) are molded or formed with boreholes, pockets, valve seats, etc. directly in the production process without later processing in the segments (21, 22, 24, 25) and pistons (4, 6, 10).

10. Door closer according to Claims 7 and 8, characterized in that the housing (29) and (9) are closed on the end faces by separate closures (18, 19).

11. Door closer according to one or more of the preceding claims, characterized in that the housing (2) and (9) and/or the segments (21, 22, 24, 25) have attachment devices (28) formed without cutting for assembly of the door closer.

12. Door closer according to Claims 1 and 2, characterized in that a carbon fiber-reinforced or glass fiber-reinforced plastic is used as the plastic.

13. Door closer according to Claims 1 and 2, characterized in that a non-return valve (5), which is constructed directly during the production, is contained in the damping piston (4), the spring piston (6), /12
and/or the plastic piston (10).

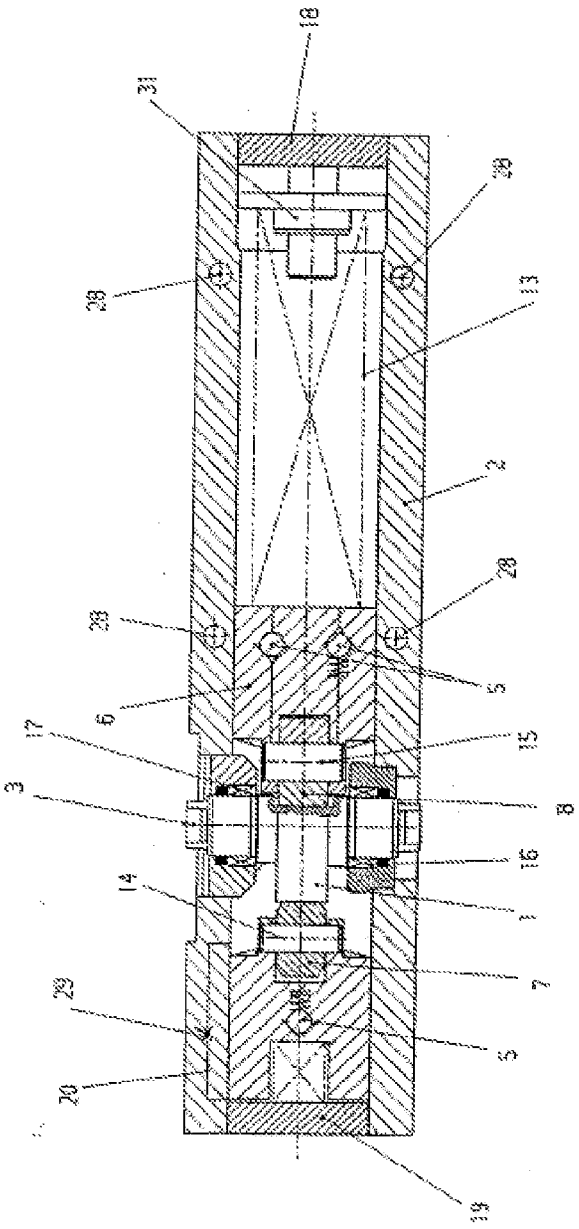
14. Door closer according to Claims 7, 8, and 10, characterized in that the segments (21, 22, 24, 25) and closures (18, 19) are connected to each other by adhesion, ultrasonic fusing, laser fusing, or the like.

15. Door closer according to Claim 3, characterized in that the cement box belonging to ground door closers is made from plastic.

16. Method for producing a door closer according to the preceding claims, characterized in that all of the parts made from plastic are produced in a non-cutting method, advantageously an injection-related method, and are connected among each other or to each other by adhesion, ultrasonic fusing, laser fusing, or the like without additional later processing.

17. Method according to Claim 16, characterized in that the assembly runs by means of an automatic production process.

Fig. 1


18
31
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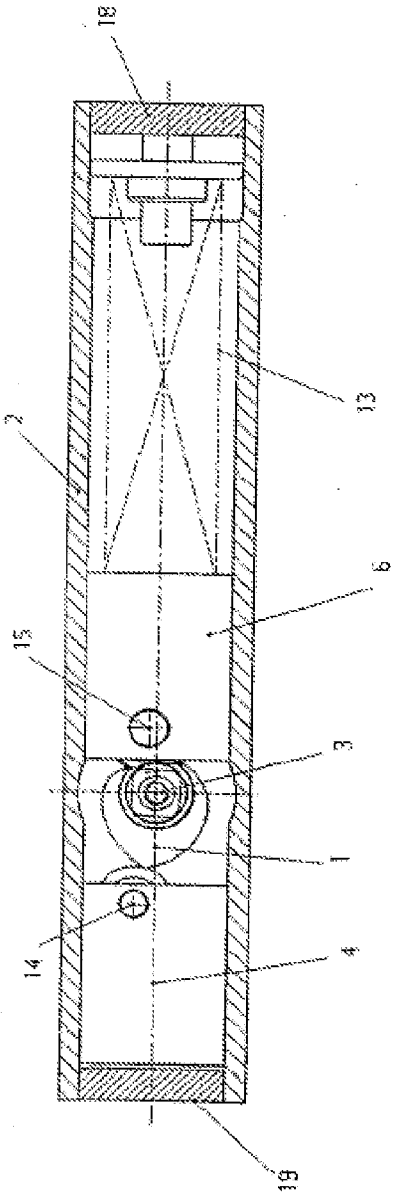
19

Fig. 2


18
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19

Fig.3

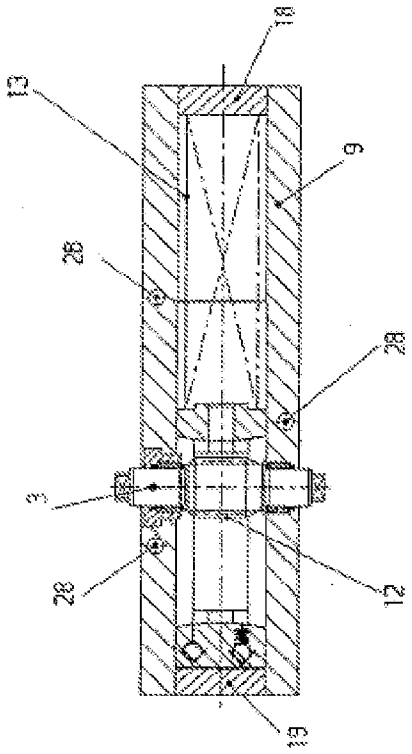
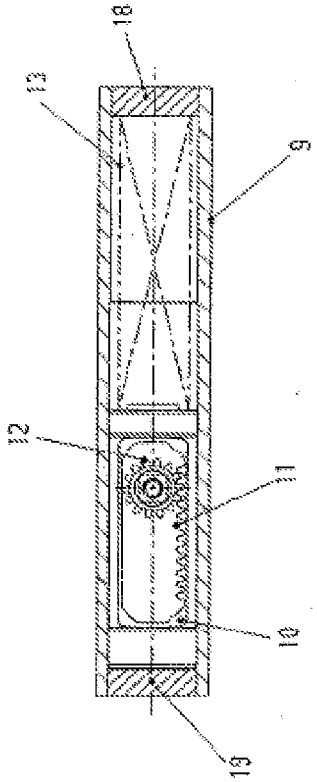


Fig.4



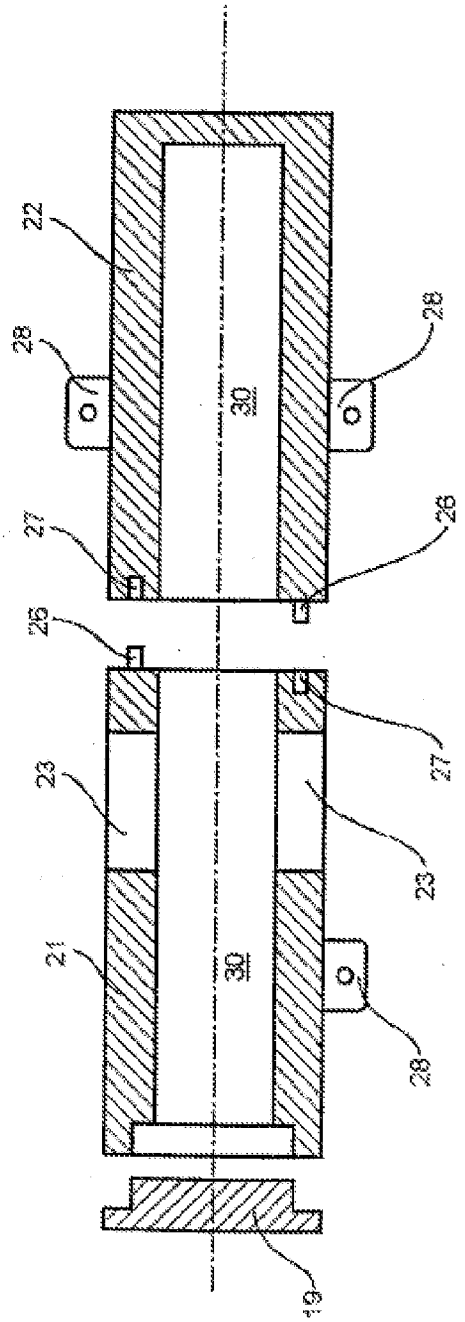


Fig. 5

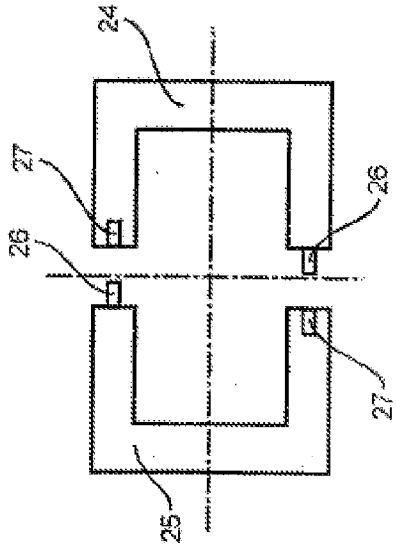


Fig. 6